

# MANUFACTURING PROCESS SPECIFICATION

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SUPERSEDING

DATED

## IDENTIFICATION AND MARKING METHODS FOR PARTS AND ASSEMBLIES GENERAL SPECIFICATION FOR

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40  
VO 75 REQUEST FOR DEVIATION

RFD NO 021

DOC NO ES500451

DOC TITLE IDENTIFICATION AND MARKING  
METHODS FOR PARTS ON ASSEMBLIES  
GENERAL SPECIFICATION FOR

EFFECT. PTM & FLT.\*

CONTRACT  
SCOPE  
CHANGE ☐ ☒ ☐

REASON FOR DEVIATION

HOT STAMPING PLASTIC POTTING BOOTS REQUIRES SPECIAL  
TOOLING NOT AVAILABLE AT GE.

DESCRIPTION OF DEVIATION

PARA. 3.3.3 STATES. HOT STAMPING SHALL BE  
USED WHENEVER A PLASTIC POTTING BOOT  
IS USED IN CONJUNCTION WITH THE  
CONNECTOR.

FOR RCA HARNESS DRAWINGS 10049625,  
10049650, 10049651:

ALTERNATE:

PLASTIC POTTING BOOTS MAY BE IDENTIFIED  
BY RUBBER STAMPING USING BLACK MARKING  
INK, WORNOW M-O-N PCT B3502673. THE  
POTTING BOOTS SHALL BE PREPARED BY LIGHTLY  
ABRASING THE SURFACE WHERE THE  
IDENTIFICATION IS TO BE APPLIED.

\* PPM will be identified with ATAG.

APPROVALS

|                                    |                                    |                                    |
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## CHANGE INCORPORATION LOG

| CHG<br>LTR | WRITER  |         | AUTHORITY        | PAGES<br>AFFECTED | DATE     | ENG. APPROVAL |         |
|------------|---------|---------|------------------|-------------------|----------|---------------|---------|
|            | INITIAL | SECTION |                  |                   |          | INITIAL       | SECTION |
| A          | PME     | 356     | Standard         |                   | 2/27/67  | RFH           | 357     |
| B          | PME     | 356     | Flt/ECI<br>51319 |                   | 8/1/67   | RFH           | 357     |
| C          | REM     | 356     | Standard         |                   | 10-21-68 | RFH           | 357     |
| D          | REM     | 356     | Standard         | *                 | 1-13-70  | RFH           | 357     |
|            |         |         |                  |                   |          |               |         |

\* Page 12, paragraphs 3. 2. 6 through 3. 2. 6. 4

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Table of Contents

| <u>Section</u> | <u>Title</u>  | <u>Page</u> |
|----------------|---|-------------|
| 1.             | SCOPE .....   | 6           |
| 2.             | APPLICABLE DOCUMENTS.....                                   | 6           |
| 3.             | REQUIREMENTS.....   | 7           |
| 3.1            | General requirements.....                                   | 7           |
| 3.1.1          | Part or assembly identification .....                       | 7           |
| 3.1.2          | Serial number .....   | 8           |
| 3.1.3          | Method of marking.....                                      | 8           |
| 3.1.3.1        | Method not specified .....                                  | 8           |
| 3.1.3.2        | Location not specified .....                                | 8           |
| 3.1.3.3        | Location or method not specified .....                      | 8           |
| 3.1.4          | Legibility .....  | 8           |
| 3.1.5          | Permanency .....  | 8           |
| 3.1.6          | Preferred characters.....                                   | 8           |
| 3.1.7          | Character height.....                                       | 8           |
| 3.1.8          | Color.....  | 9           |
| 3.1.9          | Marking sequence .....                                      | 9           |
| 3.2            | Marking processes for spacecraft parts and assemblies ..... | 9           |
| 3.2.1          | Rubber stamped markings .....                               | 9           |
| 3.2.1.1        | Surface preparation.....                                    | 9           |
| 3.2.1.2        | Rubber stamped markings (air dry ink) .....                 | 9           |
| 3.2.1.3        | Rubber stamped markings (catalyzed epoxy ink).....          | 10          |
| 3.2.2          | Silk screen markings .....                                  | 10          |
| 3.2.2.1        | Screen .....  | 10          |
| 3.2.2.2        | Material .....  | 10          |
| 3.2.2.3        | Application and cure.....                                   | 11          |
| 3.2.3          | Engraving .....   | 11          |
| 3.2.4          | Vibratory etching .....                                     | 11          |
| 3.2.5          | Electrolytic etching .....                                  | 11          |
| 3.2.6          | Printing (offset or direct).....                            | 12          |

## Table of Contents (contd)

| <u>Section</u> | <u>Title</u>  | <u>Page</u> |
|----------------|---|-------------|
| 3 (contd)      |   |             |
| 3.2.6.1        | Use .....   | 12          |
| 3.2.6.2        | Material .....                                      | 12          |
| 3.2.6.3        | Character size .....                                | 12          |
| 3.2.6.4        | Application and cure .....                          | 12          |
| 3.3            | Marking of specific types of parts.....             | 12          |
| 3.3.1          | Circuit boards and printed wiring boards.....       | 12          |
| 3.3.1.1        | Copper marking (printed wiring boards only) .....   | 12          |
| 3.3.1.2        | Rubber stamped markings.....                        | 13          |
| 3.3.1.3        | Silk screening .....                                | 13          |
| 3.3.2          | Cable assemblies.....                               | 13          |
| 3.3.2.1        | General .....                                       | 13          |
| 3.3.2.2        | Marking on glass tape.....                          | 13          |
| 3.3.2.3        | Marking on plastic labels.....                      | 13          |
| 3.3.2.4        | Marking on heat shrinkable tubing .....             | 14          |
| 3.3.3          | Connectors .....                                    | 14          |
| 3.3.3.1        | Hot stamping.....                                   | 14          |
| 3.3.3.2        | Rubber stamped markings (catalyzed epoxy ink) ..... | 14          |
| 3.3.4          | Electronic components and assemblies.....           | 14          |
| 3.4            | Marking methods for ground equipment .....          | 14          |
| 3.4.1          | Name plates.....                                    | 14          |
| 3.4.2          | Vinyl labels.....                                   | 15          |
| 3.4.2.1        | Preferred color scheme.....                         | 15          |
| 3.4.2.2        | Material .....                                      | 15          |
| 3.4.3          | Metal labels.....                                   | 15          |
| 3.4.4          | Forged, cast, or molded markings.....               | 15          |
| 3.4.4.1        | Raised characters .....                             | 15          |
| 3.4.4.2        | Depressed characters.....                           | 15          |
| 3.4.5          | Rubber stamped markings (air dry ink) .....         | 16          |
| 3.4.6          | Impression stamping with metal dies .....           | 16          |
| 3.4.6.1        | Letters and figures.....                            | 16          |
| 3.4.6.2        | Metal support .....                                 | 16          |
| 3.4.6.3        | Stamping.....                                       | 16          |
| 3.5            | Identification tags.....                            | 16          |

## Table of Contents (contd)

| <u>Section</u> | <u>Title</u>   | <u>Page</u> |
|----------------|--|-------------|
| 3 (contd)      | 3.5.1 Identification tag materials .....                               | 16          |
|                | 3.5.2 Identification tag location .....                                | 16          |
|                | 3.5.3 Tagging parts without holes .....                                | 16          |
|                | 3.5.4 Packaging small parts .....                                      | 17          |
| 4              | QUALITY ASSURANCE PROVISIONS.....                                      | 17          |
|                | 4.1 Inspection .....   | 17          |
|                | 4.2 Responsibility for inspection .....                                | 17          |
|                | 4.3 Verification .....   | 17          |
| 5              | PREPARATION FOR DELIVERY.....  | 18          |
|                | 5.1 Marking for shipment and storage.....                              | 18          |
| 6              | NOTES .....  | 18          |
|                | 6.1 Marking of metals .....  | 18          |
|                | 6.1.1 Aluminum and its alloys.....                                     | 18          |
|                | 6.1.2 Magnesium and its alloys .....                                   | 21          |
|                | 6.1.3 Stainless steels .....   | 21          |
|                | 6.1.4 Titanium and its alloys.....                                     | 21          |
|                | 6.1.5 Beryllium.....   | 22          |
|                | 6.1.6 Copper and its alloys.....                                       | 22          |
|                | 6.2 Marking process and sequence of marking nonmetallic materials..... | 22          |

## Tables

|          |  |    |
|----------|--|----|
| Table I  | Gorton Lettering Guide.....  | 11 |
| Table II | Permanent Marking Process on Various Metallic Surfaces Listed In Order of Preference for Final Surface Condition ..... | 19 |

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## 1. SCOPE

1.1 This specification covers the Identification and Marking Methods for Parts and Assemblies for spacecraft and ground equipment.

## 2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue as specified in the contractual instrument (or as specified for use within JPL), form a part of this specification to the extent specified herein:

### SPECIFICATIONS

#### Jet Propulsion Laboratory

|                 |   |
|-----------------|---|
| 30602           | Standard Specification, Engraving on Ground Equipment, Control Panel Faces                                      |
| GPO- 31523 -PRS | Process Specification, General Spacecraft, Electrolytic Etching Process, Identification of Parts and Assemblies |
| BS502545        | Material Specification, Epoxy Structural Adhesive (Epon 901/B-1) Detail Specification for                       |
| BS502598        | Material Specification, Glass Cloth Tape Pressure-Sensitive (Mystik 7000) Detail Specification for              |
| BS502643        | Material Specification, Marking Ink (Opaque No. 73X) Detail Specification for                                   |
| BS502673        | Material Specification, Permanent Marking Ink (Wornowink Series M/Catalyst A) Detail Specification for          |
| BS502674        | Material Specification, Permanent Marking Colors (Cat-L-Ink, Series 50,000/20) Detail Specification for         |
| BS502691        | Material Specification, Epoxy Coating (Cat-A-Lac 473-1), Detail Specification for                               |

Military

MIL-V-173

Varnish, Moisture-Fungus-Resistant for the Treatment of Communication, Electronic, and Associated Electrical Equipment

## STANDARD

Military

MIL-STD-129

Marking for Shipment and Storage

## DRAWING

Jet Propulsion Laboratory

ST10587

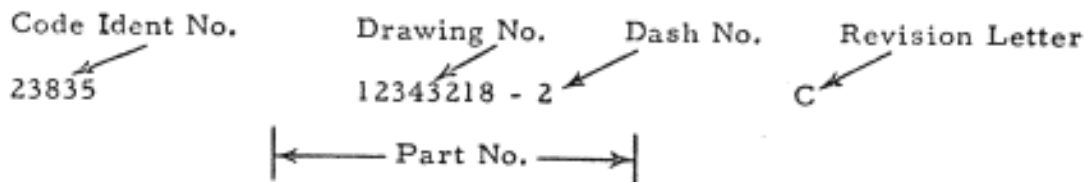
Insulator, Shrinkable, RNF-100

(Copies of specifications, standards, procedures, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by such activity.)

## 3. REQUIREMENTS

## 3.1 General requirements

3.1.1 Part or assembly identification. The identification required by the engineering drawing or other applicable document shall be located in the general position shown below.



In many instances, the code ident, dash number or revision letter may not be required.

When a manufacturer's code identification number is used, it may be located at any convenient position, however, if it is on the same line as the part number (as shown in the example above), it shall be separated by sufficient space, so it will not be construed as part of the part number.



3.1.2     Serial number. Parts and assemblies shall be marked with a serial number when required by the engineering drawing, or any applicable document. Unless otherwise specified, serial numbers shall be assigned in numerical order for each drawing number and dash number, and shall continue in sequence, regardless of the drawing revision letter. It shall be located as shown on the applicable detail drawing and marked as "SN".

3.1.3     Method of marking. The method of marking and location shall be as specified on the engineering drawing or applicable document.

3.1.3.1   Method not specified. If this specification is referenced with the location but not the method of marking indicated, the information shall be rubber stamped as specified in 3.2.1.

3.1.3.2   Location not specified. If this specification is referenced with the method but not the location being specified, the marking shall be located where it will be readily visible, but will not interfere with the functional use of the part or assembly.

3.1.3.3   Location or method not specified. If this specification is referenced without qualification and location or method of marking is not indicated, an identification tag shall be attached as specified in 3.5.

3.1.4     Legibility. The marking shall be clean and legible and shall consist of characters which are sharp and well defined.

3.1.5     Permanency. The marking should be as permanent as the normal life expectancy of the part, and shall be capable of withstanding the required environmental and sterilization processes where applicable.

3.1.6     Preferred characters. Preferred characters shall be the normal, vertical, commercial gothic design. Compressed or condensed letters may be used when space is limited.

3.1.7     Character height. Unless otherwise specified, characters shall be 1/8-inch high.

3.1.8 Color. Color of rubber stamped markings shall be as specified on the applicable drawing. If color is not specified, either black or yellow shall be used, whichever color affords the greater contrast.

3.1.9 Marking sequence. Unless otherwise specified on the applicable engineering drawing, all markings shall be applied to the finished part prior to any thermal control processing, environmental testing, or sterilization.

3.2 Marking processes for spacecraft parts and assemblies. The marking processes used on spacecraft flight equipment shall be selected from those subsequently listed, except that printed wiring boards, terminal boards, electrical cables or harnesses and connectors shall be marked as specified in 3.3.

3.2.1 Rubber stamped markings. Rubber stamped markings shall be applied using either an air drying or a catalyzed epoxy type of ink in accordance with the following requirements.

3.2.1.1 Surface preparation. The surface face to be marked shall be free of grease, oil, dirt or other contaminants. Solvent cleaning is recommended.



The solvents used must be compatible with the materials being cleaned to avoid damage.

3.2.1.2 Rubber stamped markings (air dry ink). The air dry ink used for rubber stamped markings shall conform to the requirements of JPL Specification BS502643 (Opaque No. 73X).

Note: 73X ink thinner is seldom used to thin ink directly, but it is usually applied to stamp pads as a conditioner, or it is used to clean the type on rubber stamps.

Rubber stamped markings applied with an air dry type of ink shall be top coated with a clear, protective coating. Coating of catalyzed epoxy inks is not required, (refer to 3.2.1.3). The protective coating shall conform to the

requirements of JPL Specification BS502691 (Cat-A-Lac 473-3-1). The coating material shall be mixed with the catalyst in the ratio of three parts by volume of coating to one part by volume of catalyst. The coated surface may be handled after drying for four hours at room temperature (70°F or higher) or after force drying for one hour at 150°F (maximum).

3.2.1.3 Rubber stamped markings (catalyzed epoxy ink). Rubber stamped markings applied using a catalyzed, epoxy ink shall be in accordance with the following requirements:

- a. The catalyzed ink shall conform to the requirements of JPL Specification BS502673.
- b. The ink shall be mixed with Catalyst A in the ratio of 20 parts by weight of ink to one part by weight of catalyst.
- c. A small portion of the mixed ink shall be applied to a glass or metal plate and rolled into a thin, continuous film following a procedure similar to that used in preparing finger print plates. The desired marking shall be applied by means of an appropriate rubber stamp, using the prepared plate as a stamp pad.
- d. The applied marking shall air dry for one hour at room temperature (70°F or higher) before handling. The marking will be completely cured in 24 hours at room ambient temperature or in one hour at 140 ±10°F.

3.2.2 Silk screen markings. Markings applied by a silk screen process shall be in accordance with the following requirements.

3.2.2.1 Screen. The screen shall be prepared in accordance with normal commercial practice and mounted in a frame whenever practical.

3.2.2.2 Material. The marking material shall conform to the requirements of JPL Specification BS502674 (Cat-L-Ink Series 50,000). Color shall be as specified on the applicable drawing, (refer to 3.1.8). The base resin shall

be mixed with Catalyst 20 in the ratio of 100 parts by weight of resin to six parts by weight of catalyst.

3.2.2.3 Application and cure. The silk screen mask shall be located over the area to be marked and a layer of mixed marking material squeegeed over the entire surface. The marking shall be allowed to air dry a minimum of three hours before handling and overnight before packaging or may be force dried for one hour at 150°F before handling and packaging.

3.2.3 Engraving. Engraving shall use Gorton style characters, either normal or condensed. Normal is preferred and shall be used except where space is limited. The engraving shall be equivalent to that produced on a Gorton Pantograph using the settings and dimensions shown in Table I. Engraving shall be unfilled, unless otherwise specified.

Table I. Gorton Lettering Guide

| *Number Size | Fractional Size | Cutter Size | Cutter Tip Radius | Cutter Depth |
|--------------|-----------------|-------------|-------------------|--------------|
| 5            | 3/16 inch       | 0.030       | 0.015             | 0.008-0.010  |
| 7            | 1/8 inch        | 0.020-0.022 | 0.010-0.011       | 0.006-0.007  |
| 10           | 3/32 inch       | 0.015       | 0.0075            | 0.006-0.007  |

\*The Pantograph setting when using the Gorton Lettering Guide.

3.2.4 Vibratory etching. The style, proportions, and depth of characters accomplished by vibratory etching should approximate the requirements for engraved characters.

3.2.5 Electrolytic etching. Etching marks shall be applied in accordance with JPL Specification GPO-31523-PRS. Location of marking shall be in the area designated on the applicable engineering drawing. Electrolytic etching shall not be done on electronic parts or assemblies containing those parts.

3.2.6 Printing (offset or direct). Markings applied by offset or direct printing shall be in accordance with the following requirements.

3.2.6.1 Use. Printing shall be considered equal to either silk screen process or rubber stamping with epoxy ink, and may be used in lieu of these processes except where printing would damage or impair the function of the part being marked.

3.2.6.2 Material. The marking material shall be Wornowink M, or other approved material. Color shall be as specified on the applicable drawing (refer to 3.1.8). Wornowink M shall be mixed with Catalyst A in the ratio of 20 parts by weight of ink to one part by weight of catalyst.

3.2.6.3 Character size. Height of characters shall be either 6 point or 10 point, depending on the size of part being marked.

3.2.6.4 Application and cure. Ink shall be applied using a printing press suitable for the intended purpose. Either offset or direct printing may be used. Wornowink M shall be cured for one hour at room temperature (70°F or higher) before handling. The marking will be completely cured in 24 hours at room temperature or in one hour at 140 ±10°F.

3.3 Marking of specific types of parts. Marking of specific types of parts shall be as follows.

3.3.1 Circuit boards and printed wiring boards. The type of marking shall be indicated on the applicable engineering drawing in accordance with the following.

3.3.1.1 Copper marking (printed wiring boards only). Copper markings shall be photo etched and plated in the same operation with conductors and pads. The required markings shall be included as part of the master art pattern. Character height shall be not less than 0.06 inch. Etched copper markings should be used only where the marking does not change from part to part.

3.3.1.2 Rubber stamped markings. Marking of terminal or printed wiring boards may be accomplished by rubber stamping, using either an air dry ink and topcoat or a catalyzed epoxy ink per 3.2.1. The stamped marking or clear topcoat shall not be applied over any circuitry, pads or other areas to be subsequently soldered.

3.3.1.3 Silk screening. Terminal or printed wiring boards may be marked by silk screening in accordance with the requirements specified in 3.2.2. The markings shall not be applied over any area to be subsequently soldered.

3.3.2 Cable assemblies. Cable assemblies shall be marked using any of the methods subsequently listed. The method used shall be as specified on the engineering drawing or other applicable document.

3.3.2.1 General. The marking shall be located at the center of the cable or in the area of the cable having the greatest bulk, in such a manner that the marking is visible after installation. Operational support equipment (OSE) cables shall be marked at both ends.

3.3.2.2 Marking on glass tape. The marking shall be typed with black ribbon on pressure sensitive glass tape conforming to the requirements of JPL Specification BS502598 Royal Typewriter Ribbon, Nylon, Black from the Royal Typewriter Division of Litton Industries, is recommended.

The marked tape shall be secured parallel to the length of the cable, by using 1/4-inch strips of the same type of glass cloth tape to cover the ends of the marked tape, while encircling the cable assembly. The marked tape shall be removed prior to flight.

3.3.2.3 Marking on plastic labels. The specified marking shall be applied to plastic labels (Kynar or Mylar) by hot stamping or other approved method. The marked label shall be secured parallel to the length of the cable by means of Ty-Raps or cable ties, passing through holes in the corners of the label.

3.3.2.4 Marking on heat shrinkable tubing. The specified marking shall be applied to heat shrinkable tubing (JPL Drawing ST10587) by hot stamping. The tubing shall be clear with the black or red markings applied prior to installation. Slide the expanded tubing over the cable and locate as required. Shrink in place using a portable hot air blower. Care shall be taken not to apply excessive heat during shrinking.

3.3.3 Connectors. Connectors shall be marked using any of the methods subsequently listed. Hot stamping is the preferred method, and shall be used whenever a plastic potting boot is used in conjunction with the connector.

3.3.3.1 Hot stamping. Markings shall be applied to the potting boot using a Kingsley Marking Machine, or equal. Marking shall be applied, prior to installation of wires. The foil used for marking nylon potting boots shall be K-48-Red (Kingsley Marking Machine Co. ). K-46 or K-30 Black may be used if red affords inadequate contrast.

3.3.3.2 Rubber stamped markings (catalyzed epoxy ink). Markings may be applied by rubber stamping with epoxy ink following the procedures specified in 3.2.1.3

3.3.4 Electronic components and assemblies. Electronic components shall be marked by rubber stamping, silk screen or by means of polyester base labels. Assemblies containing electronic components shall be marked by rubber stamping per 3.2.1.2 or 3.2.1.3, or silk screening.

3.4 Marking methods for ground equipment. Ground equipment may be marked by any of the methods described in 3.2, or any of the additional methods subsequently specified.

3.4.1 Name plates. Name plates may be marked in any suitable manner that meets the requirements of Section 3. Fasteners used for attaching name plates to a part shall not damage the part electrically or structurally.

3.4.2 Vinyl labels. Requirements for Vinyl labels shall be as follows.

3.4.2.1 Preferred color scheme. The preferred color scheme of vinyl labels is a black label with white characters.

3.4.2.2 Material. Vinyl labels shall be made of vinyl tape, or equal, with pressure sensitive adhesive.

Note: Vinyl labels will not withstand temperatures above +140°F.

3.4.3 Metal labels. Bonded metal foil labels may be used in applying markings to nonmetallic parts (when RF transparency is not required) and extremely fragile structures. Use pressure sensitive labels or bond with material conforming to the requirements of JPL Specification BS505545 (Epon 901/B-1, Epoxy Structural Adhesive) mixed in the ratio of 100 parts by weight of resin to 23 parts by weight of Curing Agent B-1. The adhesive bonded parts shall be cured at room temperature for a minimum of 24 hours before handling. Marking of information on labels may be accomplished by electrolytic etching, vibratory etching, or mechanical engraving. The size and thickness shall be minimum, consistent with the marking process. Location of the label shall be in the area as designated on the applicable engineering drawing. In general, the reflectivity of the metal foil labels shall be compatible with the parent surfaces. Metal foil labels that are not exposed to the sun should be black.

3.4.4 Forged, cast, or molded markings. Forged, cast, or molded markings shall be as follows.

3.4.4.1 Raised characters. The character height of raised characters shall be 3/16 to 5/16-inch. The depth of the marking below the marking surface shall be 0.09 inch maximum.

3.4.4.2 Depressed characters. The character height of depressed characters shall be from 3/16 to 5/16-inch. The depth of the marking below the marking surface shall be 0.09 inch maximum.



3.4.5     Rubber stamped markings (air dry ink). Rubber stamped markings applied with an air dry ink shall be as specified in 3.2.1.2, except that the clear topcoat over stamped markings on ground equipment may be a nitrocellulose lacquer, acrylic lacquer, or varnish. Krylon No. 1302, or equal, may be used for tile acrylic lacquer, and material conforming to MIL-V-173, or equal, may be used for the varnish.

3.4.6     Impression stamping with metal dies. Impression stamping with metal dies shall be as follows.

3.4.6.1   Letters and figures. Letters and figures formed by impression stamping are to be rounded and free of sharp edges.

3.4.6.2   Metal support. Metal backing blocks or other means of support, centered under the area to be stamped, shall be used during impression stamping.

3.4.6.3   Stamping. The impression shall be uniform and of a minimum depth to give a legible number or figure. Over impression and marring of under surfaces in contact with the backup block shall be avoided. The impression depth shall be 0.010 to 0.015-inch.

3.5     Identification tags. Requirements for identification tags shall be as follows.

3.5.1     Identification tag materials. When identification tags are required, nonabrasive, nonconductive tags shall be used (refer to 3.1.3.2)

3.5.2     Identification tag location. Identification tags shall be attached with twine in the location as shown on the applicable drawing or in a manner as not to interfere with installation or operation of the unit.

3.5.3     Tagging parts without holes. Tagging parts without holes should be accomplished by tying the tag around the part in the most suitable manner.

3.5.4 Packaging small parts. Small parts shall be packaged in plastic polyethylene bags, with tile appropriate tags inside or attached to them.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection. The type of marking, appearance, materials, procedures and equipment shall be inspected for compliance with the requirements of this specification.

4.2 Responsibility for inspection. Unless otherwise specified in the Contractual Instrument, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the contractor may utilize his own facilities or any commercial laboratory acceptable to the Jet Propulsion Laboratory (JPL). JPL reserves the right to perform any of the inspections set forth herein where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.3 Verification. Suitable inspection shall be performed to assure that the following criteria have been met:

- a. Marking shall be complete as specified on the applicable drawing or document. Location of the markings shall be as specified. Where possible, the markings shall be located so as to be visible after installation.
- b. All markings shall be neat, legible, well defined and uniform in appearance. Spelling shall be correct. Unless otherwise specified, the marking shall be 1/8-inch in height and of a black or yellow (as applicable) color to contrast with the background.
- c. Marking materials and topcoats shall be mixed, applied and cured as specified. Rubber stamped markings, silk screened markings, or clear topcoats shall not be applied over any areas to be subsequently soldered.
- d. Engraving, etching or metal stamping shall not leave burrs or sharp edges.

## 5. PREPARATION FOR DELIVERY

5.1 Marking for shipment and storage. In addition to any special marking required by the contractual instrument, unit packages, intermediate packages, and shipping containers shall be marked in accordance with the requirements of MIL-STD-129.

## 6. NOTES

6.1 Marking of metals. Permanent marking processes of various metallic materials and sequence of marking are listed in order of preference for final surface conditions as follows.

Note: The permanent marking processes of various metallic surfaces are listed in Table II in order of preference for final surface conditioning. Bonded metal foil labels shall be used only on Ground Support Equipment (GSE).

6.1.1 Aluminum and its alloys. Aluminum and its alloys shall be marked as follows:

a. Thin clear anodized, dyed anodized, hard anodized, alodined, iridited, plated, polished surfaces:

- 1) ① Deep electrolytically etch, ② engrave, or ③ vibratory etch before processing.
- 2) ① Electrolytically etch, \* ② bonded metal foil labels after processing.

b. As fabricated - unpolished surfaces:

- 1) ① Electrolytically etch, ② engrave, ③ vibratory etch, or ④ bonded metal foil labels.

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\* Except hard anodized surfaces.

Table II. Permanent Marking Process On Various Metallic Surfaces Listed In Order Of Preference For Final Surface Condition (sheet 1 of 2)

| Final Surface Condition |   | Mechanical Engraving | Vibratory Etching | Electrolytic Etching | Deep Electrolytic Etching | Bonded Metal Foil Labels (GSE Only) |
|-------------------------|---|----------------------|-------------------|----------------------|---------------------------|-------------------------------------|
| ALUMINUM & ITS ALLOYS   | A. This Clear Anodized Dyed Anodized, Hard Anodized, Alodized, Iridited, Plated, Polished Surfaces<br>a. Before Processing<br>b. After Processing<br>*Except Hard Anodized Surfaces | ②                    | ③                 | ①*                   | ①                         | ②                                   |
|                         | B. As fabricated - Unpolished Surfaces  | ②                    | ③                 | ①                    |                           | ④                                   |
| MAGNESIUM & ITS ALLOYS  | A. Conversion Coated (Dow Nos. 1, 7, 19), Anodic Coated (Dow No. 17), and Plated Surfaces<br>a. Before Processing<br>b. After Processing - Flight Equipment - Silkscreen            | ②                    | ③                 |                      | ①                         | ①                                   |
| STAINLESS STEELS        | A. Polished, Plated, Black Oxide Coated Surfaces<br>a. Before Processing<br>b. After Processing   | ②                    | ③                 | ①                    | ①                         | ②                                   |
|                         | B. As fabricated - Unpolished Surfaces  | ②                    | ③                 | ①                    |                           | ④                                   |
| TITANIUM & ITS ALLOYS   | A. Polished - Plated Surfaces<br>a. Before Processing<br>b. After Processing  | ②                    | ③                 | ①                    | ①                         | ②                                   |
|                         | B. As Fabricated - Unpolished Surfaces  | ②                    | ③                 | ①                    |                           | ④                                   |

Table II. Permanent Marking Process On Various Metallic Surfaces Listed In  
Order Of Preference For Final Surface Condition (sheet 2 of 2)

| Final Surface Condition |  | Mechanical Engraving | Vibratory Etching | Electrolytic Etching | Deep Electrolytic Etching | Bonded Metal Foil Labels (GSE Only) |
|-------------------------|--|----------------------|-------------------|----------------------|---------------------------|-------------------------------------|
| BERYLLIUM               | A. As Fabricated - Unpolished Surfaces | ②                    | ③                 | ①                    |                           | ④                                   |
|                         | B. As Fabricated - Unpolished Surfaces | ②                    | ③                 | ①                    |                           | ④                                   |
| COPPER & ITS ALLOYS     | A. Plated, Black Oxide Coated Surfaces | ②                    | ③                 |                      | ①                         |                                     |
|                         | B. As Fabricated - Unpolished Surfaces | ②                    | ③                 | ①                    |                           | ④                                   |

6.1.2      Magnesium and its alloys.      Magnesium and its alloys shall be as follows:

- a.      Conversion coated (Dow Nos. 1, 7, 19); anodic coated (Dow No. 17) and plated surface:
  - 1)      Before processing - (1) Deep electrolytically etch, (2) engrave, or (3) vibratory etch.
  - 2)      After processing - silk screen.

6.1.3      Stainless steels.      Stainless steels shall be as follows:

- a.      Polished, plated, black oxide coated surfaces:
  - 1)      (1) Deep electrolytically etch, (2) engrave, or (3) vibratory etch before processing.
  - 2)      (1) Electrolytically etch, (2) bonded metal foil labels after processing.
- b.      As fabricated - unpolished surfaces:
  - 1)      (1) Electrolytically etch, (2) engrave, (3) vibratory etch, or (4) bonded metal foil labels.

6.1.4      Titanium and its alloys.      Titanium and its alloys shall be as follows:

- a.      Polished, plated surfaces:
  - 1)      (1) Deep electrolytically etch, (2) engrave, or (3) vibratory etch before processing.
  - 2)      (1) Electrolytically etch, (2) bonded metal foil labels after processing.
- b.      As fabricated - unpolished surfaces:

- 1) ① Electrolytically etch, ② engrave, ③ vibratory etch, or ④ bonded metal foil labels.

6.1.5 Beryllium. Beryllium shall be as follows:

a. As fabricated - unpolished:

- 1) ① Electrolytically etch, ② engrave, ③ vibratory etch, or ④ bonded metal foil labels.

6.1.6 Copper and its alloys. Copper and its alloys shall be as follows:

a. Plated, black oxide coated surfaces:

- 1) ① Deep electrolytically etch, ② engrave, or ③ vibratory etch before processing.

b. As fabricated - unpolished surfaces:

- 1) ① Electrolytically etch, ② engrave, ③ vibratory etch, or ④ bonded metal foil labels.

6.2 Marking process and sequence of marking nonmetallic materials.  
Parts and assemblies shall be marked as follows:

- a. ① Rubber stamped markings using either an air dry ink with clear topcoat or a catalyzed epoxy ink. Offset or direct printing using a catalyzed epoxy ink is equivalent.
- b. ② Silk screening. Recommended where a large number of identical markings must be made. A screen must be made for each different marking.
- c. ③ Identification tags per 3.4.5.
- d. ④ Metal foil labels (in GSE applications where RF transparency is not required).